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10/587,656	07/28/2006	Toshimasa Kumaki	065341.00011	2833

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EXAMINER	
ROE, JESSEE RANDALL	
ART UNIT	**PAPER NUMBER**
1793	

NOTIFICATION DATE	DELIVERY MODE
03/25/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary	Application No.	Applicant(s)	
	10/587,656	KUMAKI ET AL.	
	Examiner	Art Unit	
	Jessee Roe	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 January 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) *1,3-7,9,10,12,15 and 20-25* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *2, 8, 11, 13-14 and 16-19* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 July 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8 December 2009*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of the Claims

Claims 1-25 are pending wherein claims 2 and 11 are amended and claims 1, 3-7, 9-10, 12, 15 and 20-25 are withdrawn from consideration.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 2, 8, 11, 13-14 and 16-19 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In regards to claims 2 and 11, the specification does not provide support for a "first portion" and a "second portion" as set forth in the pending claims.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 2, 8, 11, 13-14 and 16-19 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 2 recites the limitation "the material" in line 8 of claim 2 . There is insufficient antecedent basis for this limitation in the claim. Furthermore, it is unclear if “the material” refers to the "second element", the “Fe-based alloy member”, the “coating”, or the “first element”.

Claim 11 recites the limitation “at the portion” in line 14 of claim 11. It is unclear whether "at the portion" is referring to the "first portion" or the "second portion" and therefore the claims are indefinite.

Claim Rejections - 35 USC § 102/103

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 8 and 16-19 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kaufman (US 4,011,077).

In regards to claim 2, Kaufman ('077) discloses a method for producing an iron-based alloy parts wherein an alloyed additive powder having selected alloying ingredients (such as manganese, nickel, molybdenum) blended with the iron-base (iron-carbon-alloy) powder and the additive alloy powder is coated with copper (first portion) (applied to a surface of the iron-based alloy) and sintered at a temperature in the range of 2060°F to 2080°F (1127°C to 1138°C) (abstract, col. 5, lines 10-25, col. 7, lines 12-31, and col. 10, lines 26-29). Kaufman ('077) further discloses that the outer peripheral region of each iron base powder particle (second portion) will become enriched with carbon and alloying ingredients.

Since Kaufman ('077) discloses substantially similar steps of treating the same or substantially the same composition, the structure "wherein said coating contains a thickness of at least 0.5 mm and a carbide formed by carbonizing a first element that has a property for increasing hardness of an Fe-based alloy, wherein a second element other than said first element, is contained in said Fe-based alloy, said second element having an amount which is larger in said surface layer portion as compared with said inside portion, and wherein an amount of said first element increases from said surface layer portion in said inside portion" would be expected. MPEP 2112.01 I.

Alternatively, it would have been obvious to one having ordinary skill in the art to modify the size/quantity of the particles of alloy additive powder having ingredients (such as manganese, nickel, and molybdenum) such that thickness of 0.5 mm would be met since the ratio of base alloy powder to additive alloy powder is result-effective in terms of compressibility and cost (economy) (col. 6, lines 45-63). MPEP 2144.05 II.

In regards to claim 8, Kaufman ('077) discloses copper (abstract).

In regards to claims 16-19, Kaufman ('077) discloses chromium, manganese, and nickel (abstract). A carbide of chromium, manganese, and nickel of the form M_6C or $M_{23}C_6$ ((Fe,M) $_6$C or (Fe,M) $_{23}$ C_6 would be expected since Kaufman ('077) discloses the same or substantially the same composition in addition to the same or substantially the same process.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 8 and 16-19 are rejected under 35 U.S.C. 103(a) being unpatentable over Tahara et al. (US 5,792,282) alone, or alternatively in view of the ASM Handbook Volume 4.

In regards to claim 2, Tahara et al. ('282) discloses carburizing austenitic stainless steel members, which inherently has an iron-base, comprising 1 to 6 weight percent molybdenum and 13 to 25 weight percent chromium (abstract and col. 2, lines 57-67). Tahara et al. ('282) discloses that carbon diffuses and penetrates the surface to form a deep uniform layer (col. 6, lines 23-29) wherein chromium carbide can hardly be

identified and more of the chromium is present in the steel than in the case (col. 8, lines 1-22). The Examiner notes that the structure disclosed by Tahara et al. ('282) is the same as that of the instant invention. Therefore, an increase in hardness from the surface to an inside portion thereof is expected. MPEP 2112.01 I.

With respect to the recitation "and comprising a thickness of at least 0.5 mm" in line 5 of claim 2, merely changing the proportion (thickness) of a prior art product would not be sufficient to distinguish from the prior art. MPEP 2144.04 IV(A).

Alternatively, Tahara et al. ('282) does not specify the thickness of the carburized layer.

The ASM Handbook Volume 4 discloses that by modifying time and/or temperature, a carburized layer thickness of greater than 1 mm can be achieved (pg. 314, col. 2 – pg. 315, col. 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified time and temperature, as disclosed by the ASM Handbook Volume 4, while carburizing as disclosed by Tahara et al. ('282), in order to achieve any desired carburized layer thickness. MPEP 2144.05 II.

In regards to claim 8, Tahara et al. ('282) discloses that the presence of carbon is higher in the surface portion than that of the inside portion (col. 3, lines 30-44 and col. 6, lines 23-29).

In regards to claims 16-19, Tahara et al. ('282) discloses the formation of $Cr_{23}C_6$ (col. 8, lines 1-23) and the addition of molybdenum for the stabilization of ferrite (iron in

solid solution) (col. 3, lines 44-52). Therefore, the presence of (Fe, Cr) $_{23}C_6$ is expected.

Claims 2, 8, 11, 13-14 and 16-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wang et al. (US 6,680,129).

In regards to claims 2, 8, 11, 13-14, 16 and 18, Wang et al. ('129) discloses making steel articles with hard, wear-resistant carbide coatings (abstract) wherein a niobium carbide, vanadium carbide, or mixed vanadium/niobium carbide coating placed on the steel article by utilizing a chemical deposition process carried out with the aid of immersion in vanadium, niobium or mixed vanadium/niobium powder (col. 2, line 60 – col. 3, line 14). Wang et al. ('129) further discloses that the niobium and/or vanadium draw carbon (second element) from the substrate steel to the surface to form the carbide layer, thereby having a surface layer with more carbon compared with the inside of the steel article (col. 3, lines 3-15), and drawing a small amount of chromium (first element) from the steel substrate in the vanadium, niobium or niobium and vanadium coating (abstract and col. 3, lines 44-55), thereby having chromium (first element) increase from the surface layer to the inside portion.

With respect to the recitation "applying, to a surface of said Fe-based alloy, a powder made up of a substance which contains said second element" in lines 11-12 of claim 11, Wang et al. ('129) discloses mixing chromium with vanadium and niobium in the powder pack (col. 3, lines 44-55).

With respect to the recitation “heat-treating said Fe-based alloy with said powder applied thereto, so that said first element is diffused to said surface layer portion, and said first element reacts with carbon existing in said surface layer portion of said Fe-based alloy to form said carbide” in lines 13-15 of claim 11, Wang et al. ('129) discloses tumbling in the niobium and/or vanadium and/or chromium powder at 1600°F to 2000°F (col. 4, lines 37-51).

With respect to the formation of a coating with a thickness of at least 0.5 mm in line 6 of claim 11, Wang et al. (‘129) discloses heating at 1600°F to 2000°F for a time sufficient to form a coating of desired thickness on the article having a hardness of at least HV2000. Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to modify the time at a temperature in the temperature range of 1600°F to 2000°F to achieve the desired coating thickness. MPEP 2144.05 II.

With respect to the recitation "wherein said carbide comprises a compositional formula of M_6C or $M_{23}C_6$ wherein M represents a metal element” in claim 17 and wherein said carbide comprises a compositional formula of $(Fe,M)_6C$ or $(Fe,M)_{23}C_6$ wherein M represents a metal element” in claim 19, the Examiner notes that Wang et al. (‘129) discloses forming chromium carbides, niobium carbides, and vanadium carbides (col. 5, lines 5-12). Additionally, because Wang et al. ('129) discloses a substantially similar process and composition, these carbides would be expected. MPEP 2112.01 I.

Response to Arguments

Applicant's arguments filed 28 January 2010 have been fully considered but they are not persuasive.

First, the Applicant primarily argues that Kaufman (‘077) is directed to a mechanical mixture of selected powders that are compressed into a pre-compact, whereby the pre-compact is subjected to liquid phase sintering for producing a raw alloy steel product; the mixture of selected powders prevents a premature solid state diffusion of carbon between and into effective barrier to carbon loss during heating to the sintering temperature and while in the solid state condition; Kaufman (‘077) fails to describe a “coating disposed on an outer surface of a first portion of the layered Fe-based alloy member”, "a second element disposed in a second portion of the layered Fe-based alloy member", or "wherein a hardness of the layered Fe-based alloy member at the first portion is greater at the inside portion than on the outer surface of the layered Fe-based alloy member".

In response, the Examiner notes that Kaufman ('077) discloses the additive alloy powder is coated with copper (first portion) (applied to a surface of the iron-based alloy) and sintered at a temperature in the range of 2060°F to 2080°F (1127°C to 1138°C) (abstract, col. 5, lines 10-25, col. 7, lines 12-31, and col. 10, lines 26-29). Kaufman (‘077) further discloses that the outer peripheral region of each iron base powder particle (which includes a second portion) will become enriched with carbon and alloying ingredients. The Examiner also notes that Kaufman (‘077) discloses sintering at a temperature in the range of 2060°F to 2080°F (1127°C to 1138°C) (abstract, col. 5, lines

10-25, col. 7, lines 12-31, and col. 10, lines 26-29) and the instant invention requires a heat treatment in the range of 1000 to 1180°C (page 37, lines 21-25) and therefore since both Kaufman (‘077) and the instant invention require a heat treatment within the same temperature range, the same structure and properties would be expected in both Kaufman (‘077) and the instant invention. MPEP 2112.01 I.

Second, the Applicant primarily argues that Kaufman ('077) merely describes a technique for coating an Fe-C alloy powder and a technique for manufacturing a sintered body by using the coated Fe-C alloy powder and Kaufman ('077) fails to further describe or suggest that only a certain portion of the sintered of the sintered alloy parts is coated with a coating for increasing the hardness at that certain portion, while other parts of the member are not coated with a coating.

In response, the Examiner notes that “first portion” and “second portion” do not preclude the "first portion" from being entirely or part of the "second portion" and although Kaufman ('077) may begin with powders, the Applicant has failed to show that Kaufman ('077) would lack the structure as instantly claimed.

Third, the Applicant primarily argues that Tahara et al. (‘282) fails to describe or suggest "a coating disposed on an outer surface of a first portion of the layered Fe-based alloy member...a second element in a second portion of the layered Fe-based alloy member...wherein a hardness of the layered Fe-based alloy member at the first portion is great at the inside portion than on the outer surface of the layered Fe-based alloy member," as recited in claim 2.

In response, Tahara et al. (‘282) discloses carburizing austenitic stainless steel members, which inherently has an iron-base, comprising 1 to 6 weight percent molybdenum and 13 to 25 weight percent chromium (abstract and col. 2, lines 57-67). Tahara et al. ('282) discloses that carbon diffuses and penetrates the surface to form a deep uniform layer (col. 6, lines 23-29) wherein chromium carbide can hardly be identified and more of the chromium is present in the steel than in the case (col. 8, lines 1-22). The Examiner notes that the structure disclosed by Tahara et al. ('282) is the same as that of the instant invention. Therefore, an increase in hardness from the surface to an inside portion thereof is expected. MPEP 2112.01 I.

Fourth, the Applicant primarily argues that one of ordinary skill in the relevant art would have understood that in a process of carbonizing, a carbide layer (e.g. a hardened layer) is unevenly distributed at a surface layer portion (i.e., on an outer surface) of the steel and thus Tahara et al. ('282) fails to describe or suggest, at least "wherein a hardness of the layered Fe-based alloy member at the first portion is greater at the inside portion than on the outer surface of the layered Fe-based alloy member," as recited in claim 2.

In response, the Examiner notes that Tahara et al. ('282) discloses that carbon diffuses and penetrates the surface to form a deep uniform layer (col. 6, lines 23-29). Therefore, an increase in hardness from the surface to an inside portion thereof is expected. MPEP 2112.01 I.

Fifth, the Applicant primarily argues that the Office Action of 28 October 2009 merely alleges that one having ordinary skill in the relevant art, desiring a thicker film

would have known that time and/or temperature of a surface treatment could be modified to achieve a desired thickness and the Office Action of 28 October 2009 failed to provide a basis in fact and/or technical reasoning to reasonably support the Office Action's allegations that one of ordinary skill in the relevant art would have found it obvious to increase the carburizing depth described in Tahara et al. ('282) by a magnitude of over eight time when Taraha et al. ('282) explicitly describes that the maximum depth of the carburized layer is limited to 70 μm.

In response, the Examiner notes that carburizing time and carburizing temperature directly impact the depth on carbon diffusion in a substrate and this was well known in the art prior to the filing date of the instant application. As those skilled in the art know, larger carburized depths are desirable when wear resistance at lower depths within a material are desired.

Sixth, the Applicant primarily argues that Wang et al. (‘129) fails to describe or suggest "a coating disposed on an outer surface of a first portion of the layered Fe-based alloy member...a second element disposed in a second portion of the layered Fe-based alloy member... wherein a hardness of the layered Fe-based alloy member at the first portion is greater at the inside portion than on the outer surface of the layered Fe-based alloy member,".

In response, Wang et al. (‘129) discloses making steel articles with hard, wear-resistant carbide coatings (abstract) wherein a niobium carbide, vanadium carbide, or mixed vanadium/niobium carbide coating placed on the steel article by utilizing a chemical deposition process carried out with the aid of immersion in vanadium, niobium

or mixed vanadium/niobium powder (col. 2, line 60 – col. 3, line 14). Wang et al. (‘129) further discloses that the niobium and/or vanadium draw carbon (second element) from the substrate steel to the surface to form the carbide layer, thereby having a surface layer with more carbon compared with the inside of the steel article (col. 3, lines 3-15), and drawing a small amount of chromium (first element) from the steel substrate in the vanadium, niobium or niobium and vanadium coating (abstract and col. 3, lines 44-55), thereby having chromium (first element) increase from the surface layer to the inside portion.

Seventh, the Applicant primarily argues that the chain parts and other steel articles disclosed in Wang et al. (‘129) are completely coated with the carbide and therefore Wang et al. (‘129) fails to describe two separate portions, a first portion and a second portion as recited in claim 2.

In response, the Examiner notes that the claims do not require carbon both in the first portion and in the second portion and since there would be a portion having a carbide layer and a portion not having a carbide layer in Wang et al. (‘129), it seems clear that there would be two portions in Wang et al. ('129).

Eighth, the Applicant primarily argues that one of ordinary skill in the relevant art would have understood that Wang et al. ('129) describes that carbon is drawn from the steel by displacement of halide and such a reaction is distinguishable from the diffusion mechanism described for embodiment of the present invention. Additionally, the Applicant argues that only carbon diffuses toward a surface of the steel, and a composition ratio of vanadium or niobium does not change.

In response, Wang et al. ('129) further discloses that the niobium and/or vanadium draw carbon (second element) from the substrate steel to the surface to form the carbide layer, thereby having a surface layer with more carbon compared with the inside of the steel article (col. 3, lines 3-15), and drawing a small amount of chromium (first element) from the steel substrate in the vanadium, niobium or niobium and vanadium coating (abstract and col. 3, lines 44-55), thereby having chromium (first element) increase from the surface layer to the inside portion.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jessee Roe whose telephone number is (571)272-5938. The examiner can normally be reached on Monday-Thursday and alternate Fridays 7:00 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Roy King/
Supervisory Patent Examiner, Art Unit 1793

/JR/